THE DENTAL PRACTITIONER and DENTAL RECORD

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CONTENTS

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THREE SHILLINGS AND SIXPENCE

THE DENTAL PRACTITIONER
AND DENTAL RECORD

Vol. XII, No. 3 November, 1961

RADIOLOGY IN CHILD AND ADOLESCENT STOMATOLOGY*

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NEARLY every type of dental pathology may be found in children.

These include inflammatory lesions, neoplastic formations, and anomalies in both deciduous and permanent dentitions. All these conditions may affect mastication, speech, and the ultimate configuration of the facial bones.

Many of the diseases and deformities which are found in the mouth and jaws of the adult might well have been prevented or adjusted had they been recognized in early life. Also, it should be remembered that caries and sepsis in the young may endanger the health of the child, both mentally and physically.

It behoves the dental practitioner to exert every effort in his search for dental pathology in the child and adolescent, and to realize how much information can be obtained from X-ray examination. Dental radiography is probably the best means for the recognition of dental diseases, and should also be regarded as an invaluable aid in the prevention of disease. A large percentage of all children have dental abnormalities or pathological conditions which can only be positively identified by the radiograph.

There are many techniques available for dental radiography in the child and adolescent, but there is much diversity of opinion as to the age at which these examinations should commence. Also, because of the inconclusive and varied pronouncements relating to radiation hazards, there is still doubt as to how frequently radiographs may be repeated for the same patient.

The two recognized forms of X-ray examinations are intra-oral and extra-oral radiography, and these can be applied either to an individual person or be used for mass survey. There are now supplemental methods of dental radiography and these may prove of value in the radiographic examination of a child.

Three age-groups for pertinent radiographic observation might be considered as follows:—

1. From birth to three years of age. By the third year all the teeth of the first dentition, if present, should have erupted.

2. From three to six years of age. The eruption of the second dentition should have commenced with the appearance of the first

* Paper read at the Polish Stomatological Congress, Warsaw, Poland, on September 24, 1960.

permanent molar tooth, and signs of exfoliation of the deciduous teeth should be apparent.

3. From six to sixteen years of age. This is the school-age period, and all the deciduous teeth should have been shed and replaced by the full complement of permanent teeth, except the third molars.

Fig. 1.—Infant, aged 16 months. External oblique view. Calcification of the first dentition is completed in the first year. The second deciduous molar teeth are not fully erupted. The crypt of the unerupted first lower permanent molar tooth, containing a well-formed crown, is lying midway between the alveolar margin and the lower border of the mandible. No sign of the presence of the second permanent molar teeth.

1. From Birth to Three Years of Age.—When the baby is born, it carries 44 dental crypts in its jaws, the full 20 of its first dentition and 24 of the second dentition. Those of the last permanent molars of both sides in the maxilla and mandible are not formed.

Radiographically, 24 teeth are seen at birth. At the same time the crowns of all the deciduous teeth and the tips of the cusps of the first permanent molar teeth exhibit signs of various degrees of calcification.

The only indications for radiography of the jaws in the first three years of life are trauma, swellings, and deformities. The method recommended is the lateral oblique extra-oral technique (*Fig.* 1). This form of X-ray examination will reveal quite adequately the presence or absence of teeth of either dentition, the degree of calcium formation in the bony dental crypts, the position and state of eruption of the permanent teeth, and the existence of such formations as odontomes and fractures of the bone.

Fig. 2.—Boy, aged 18 months. $\underline{1|1}$ unerupted with an unerupted supernumerary tooth lying to the mesial side of $\underline{|1}$. $\underline{a|a}$ were lost as a result of an accident.

Occasionally it is possible to use intra-oral dental films in these young children, but it is the occlusal film which is best tolerated by the infant. By this means the buccal disposition of the deciduous teeth can be demonstrated, showing at the same time the unerupted permanent teeth lying on the palatal and lingual aspects. The presence of unerupted supernumerary teeth may also be easily depicted on an occlusal film (*Fig.* 2).

Radiography of a developmental anomaly such as a cleft palate is not an urgent matter in the first three years.

2. From Three to Six Years of Age.—It is practicable, and desirable, during this period, to commence routine X-ray investigation of the young child and to record all dental and associated structures. Now intra-oral

radiography can be undertaken with greater ease (*Fig.* 3).

It is remarkable how co-operative some children can be, and in the hands of a competent radiographer a full-mouth intra-oral X-ray examination is not difficult to accomplish (*Fig.* 4). Occlusal radiography should be regarded as an integral part of routine dental radiography, and is most useful in the identification of fractures of the mandible (*Fig.* 5) and localization of unerupted supernumeraries (*Fig.* 6).

In order to overcome the disagreeable experience of intra-oral films in the premolar regions of children, bi-molar radiography should be undertaken. This X-ray examination is a modification of the full external lateral oblique technique, taking each side of the face separately and masking off one half of the cassette, while exposing the other half (*Figs.* 7–10). This technique depicts both sides of the face upon one film in the same plane,

Fig. 3.—Diastema in the first dentition. The upper central deciduous teeth, in a girl aged 5 years, are widely separated. The alveolar margin of the premaxilla is grossly malformed, and the diastema will be continued between the permanent central incisors, which show marked divarication.

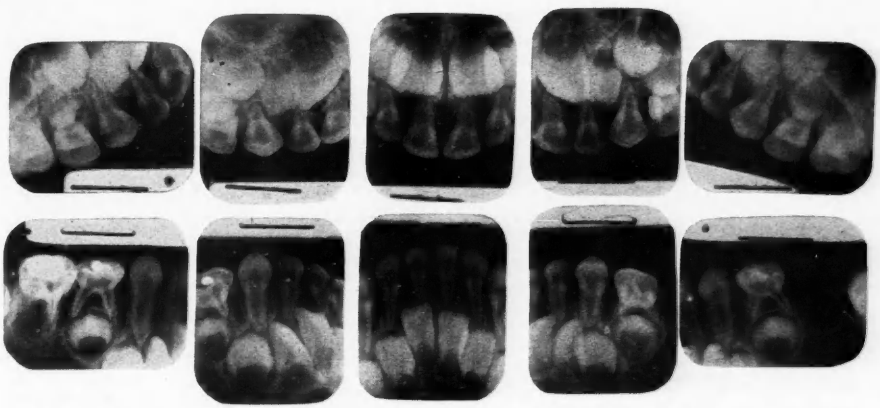

Fig. 4.—Girl, aged 4 years. No signs of resorption of the roots of the teeth of the first dentition. Root resorption begins at the end of the fourth year, beginning usually at the temporary molars and then in the incisors. Early signs of crown calcification of the lower left second permanent bicuspid tooth. The second lower left temporary molar tooth is absent.

and is especially applicable for the visualization of the premolar and molar regions in the young child. The presence, development, and eruption of the permanent molar teeth can be followed and compared, year by year, and provide valuable information to the orthodontist.

By the third year of life, the two halves of the mandible should have completed their osseous union at the symphysis menti and all the deciduous teeth should be fully erupted.

Complete anodontia of the first dentition is an extremely rare condition, and, when

verified radiographically, may be the first evidence of an endocrine imbalance. In the absence of teeth, the alveolar bone shows poor and limited growth in height.

Partial anodontia is a comparatively common occurrence and is due to lack of development in the formative organs of that particular dentition. X-ray examination should be carried out as soon as possible to determine the presence of a permanent successor to an absent deciduous tooth, so that steps might be taken to keep the space open or initiate treatment for the full development of the dental arch. The X-ray examination during this period should include intra-oral and bite-wing techniques.

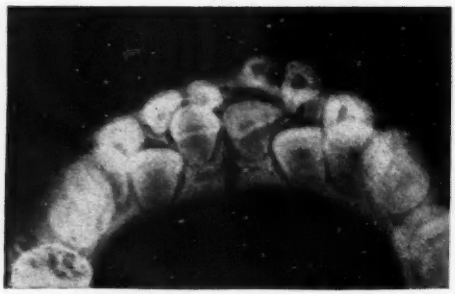

Fig. 5.—Symphysis menti. Occlusal view. Limited separation and gap between the two halves of the mandible. No deformity, and good alignment.

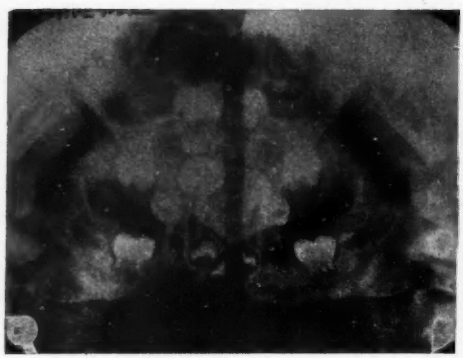

Fig. 7.—Boy, aged 3 years. All the four first permanent molar teeth are shown unerupted, with early root formation. The crowns reveal a high degree of enamel calcification. The cusps of the second permanent molar teeth in the mandible are seen in their crypts.

The integrity of the permanent arch depends upon the care given to the deciduous teeth. The proper interstitial spaces between the temporary teeth must be amply maintained, otherwise there will be interference with the natural eruption and growth of the permanent teeth.

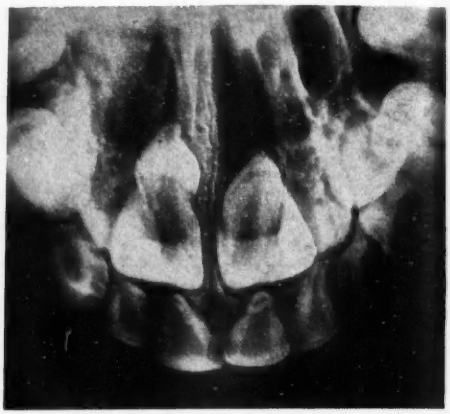

Fig. 6.—Boy, aged 4 years. $\frac{321|123}{}$ unerupted supernumeraries lying on either side of the middle line on the palatal side of $\frac{1|1}{}$.

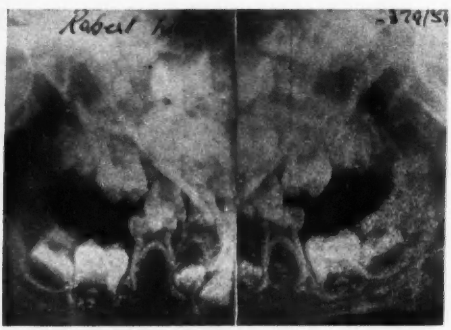

Fig. 8.—Boy, aged 5 years. All the four first permanent molar teeth have reached the alveolar margin. Calcification of the crowns of the unerupted second permanent molars is more advanced. $\frac{5|5}{}$ are absent.

The period between 4 and 6 years of age demands concentrated care of the deciduous teeth, so that preventative measures can be taken to counter premature loss of the teeth of the first dentition and at the same time

avoid disease in association with them. During these years children appear to be vulnerable to trauma, particularly subluxation of the teeth.

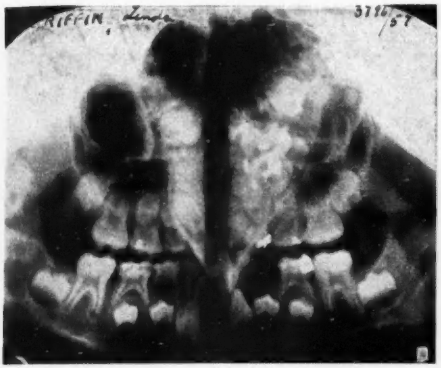

Fig. 9.—Girl, aged 7 years. The molar teeth show no further progress.

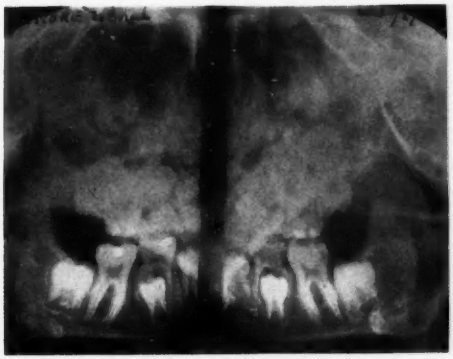

Fig. 10.—Girl, aged 9 years. $\frac{7|7}{7|7}$ appear at the alveolar margin. $\overline{8}|$ first signs of crypt formation.

Fig. 11.—Patient, aged 4 years. Apical abscess in connexion with $\underline{A}|$.

Fig. 12.—Girl, aged 13 years. $\overline{5}|$ unerupted with retained $\overline{e}|$.

Premature loss of deciduous teeth may affect normal occlusion. In the premolar region, an early loss of the deciduous teeth may produce a drifting of the permanent first molar with impaction against the first premolar, and thus obstruct eruption of the second permanent premolar.

Premature shedding of the deciduous teeth may be associated with poor dental health in the young child, specific diseases, endocrine or nutritional disorders, or systemic diseases, such as lipoidoses and Schüller-Christian disease, which affect the skeleton during the period of growth and development. However, in most cases of early exfoliation of these teeth, dental caries and periapical disease are the ultimate factors.

Caries is more prevalent in the younger age-group than in adults. The acute form of dental caries is confined mostly to children and the growing young, and the rapidity of decay is greater in them.

The affected deciduous teeth require full and exhaustive protection in order to function normally. Abscess formation associated with teeth of the first dentition may stimulate absorption of their apices, causing not only early loss of these teeth, but extension of the

infection to the unerupted permanent teeth (*Fig.* 11).

3. From Six to Sixteen Years of Age.—This is the formative period in the life of the growing child, when preventative dentistry must be practised to the full. But to be of value, both to the patient and the community, early and accurate identification of dental disease must be promoted in mass surveys amongst children and adolescents. The procedures of dental radiography are of invaluable assistance in these investigations.

So much may depend upon the radiographic evidence. With the pictorial information provided, it will be possible to decide the type of treatment to adopt, whether to practise patience and inactivity or to resort to orthodontic treatment. From the findings thus presented, the dental surgeon should determine how often X-ray observation should be undertaken, and should watch the effect upon the roots of the teeth under stress and tension from treatment.

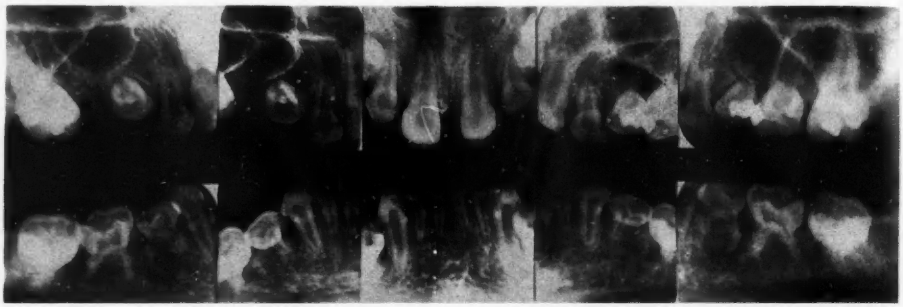

Fig. 13.—Girl, aged 10 years. $\frac{5432\ |\ 2345}{54321|12345}$ absent.

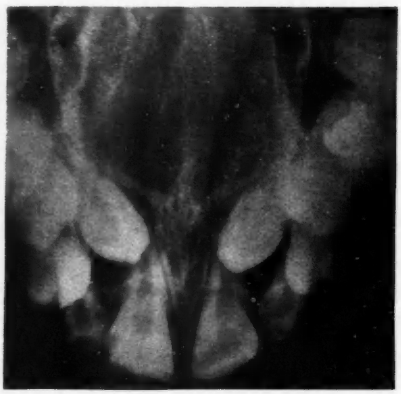

Fig. 14.—Girl, aged 10 years. $\underline{3}|\underline{3}$ bilateral unerupted upper canine teeth. Lying at an angle to each other and directed mesially. Impaction may cause resorption of the roots and apices of the incisors.

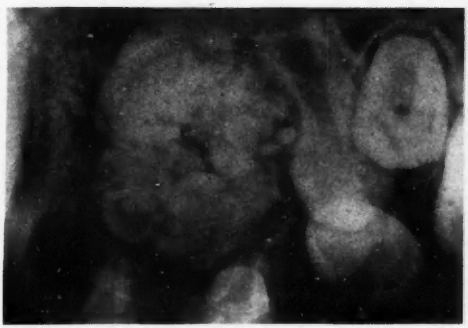

Fig. 15.—Patient, aged 9 years. $|\underline{2}$. Compound composite odontome. At operation it was found to be encapsulated, and contained a fully formed lateral tooth and innumerable small denticles.

At 6 years of age the first permanent molar teeth begin to erupt into the oral cavity, and during the next 3 or 4 years they will be followed by the eruption of the incisor and premolar teeth. Any abnormal retention of the deciduous teeth (*Fig.* 12) or supernumerary teeth will impede the eruption of the permanent teeth. X-ray examination during this period is of the utmost importance, and should, if indicated, be performed every 6 months from

the age of 6 years. Delay or non-appearance of the permanent teeth demands X-ray examination as early as possible.

The common features for identification are missing teeth (*Fig.* 13), supernumerary teeth, of slow development, and their identification and progress can only be depicted with radiographic investigation. This also is the time of life when congenital syphilis may first be discovered.

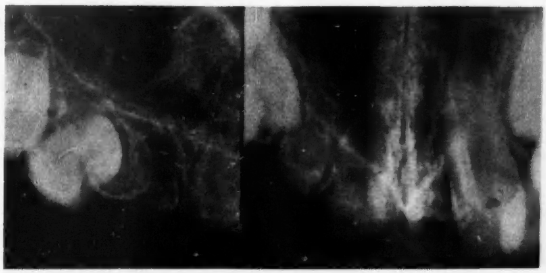

Fig. 16.—Boy, aged 9 years. Arrested development and hypocalcification of $\underline{321|1}$.

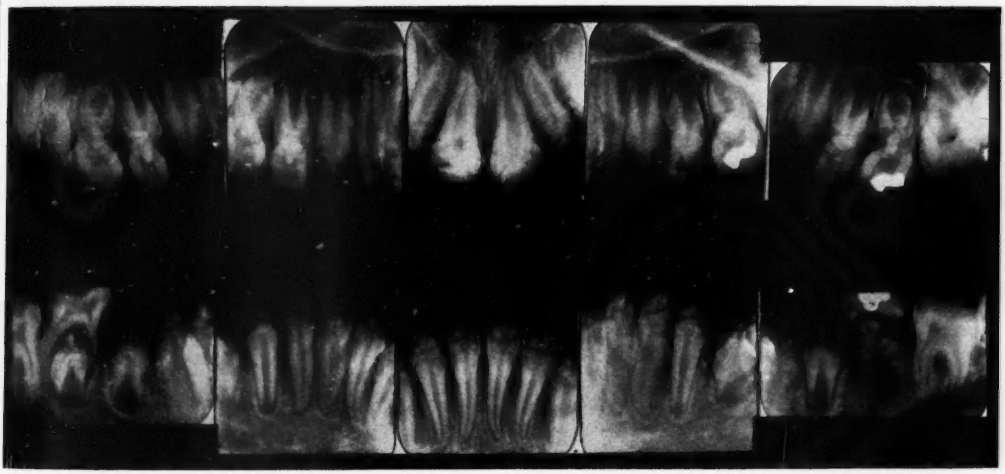

Fig. 17.—Patient, aged 9 years. Generalized amelogenesis imperfecta. Both dentitions are affected. The unerupted canines and premolars show marked hypoplasia, but the roots and pulp canals are normal.

retained deciduous roots, non-erupting teeth (*Fig.* 14), obstructed eruption such as odontomes (*Fig.* 15), submerged teeth, hypoplasia (*Fig.* 16), and amelogenesis imperfecta (*Fig.* 17). Not infrequently epulides (*Fig.* 18) and odontoclastomas (*Fig.* 19) are found in the adolescent, and of course dentigerous cysts (*Fig.* 21) appear in this age-group. Cases of fibrous dysplasia (*Fig.* 20), a perverted activity of bone formation, start in early life and are

Although there is no definite evidence that radiation interferes with the growth and eruption of teeth, it is still advisable to use the minimum amount of films for diagnosis.

Further, if radiography is to be invoked with success in treatment control, standardization of technique is imperative. Comparisons must be made to assess the effectiveness of treatment, and so repetitive films have to be produced under exactly the same conditions

of film–object position, anode–film distance current and kilovoltage, the incidence of the X-ray beam, and particularly of the exposure time.

Fig. 18.—Fibroid epulis in a girl, aged 10 years. Divarication of the lower right unerupted premolar teeth with impaction against neighbouring teeth.

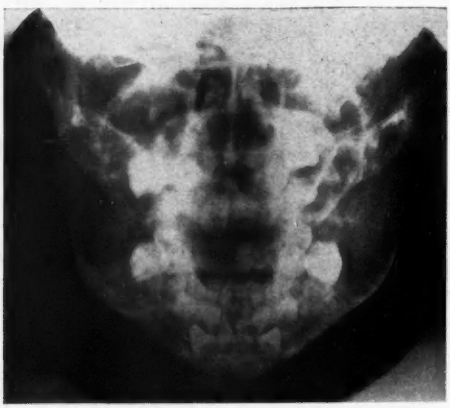

Fig. 20.—Dysplasia of bone (cherubism). Bilateral dysplasia of the facial bones in a growing child.

The craniostat, the rotograph, and the pan-oral machine all operate on standardized factors.

Many children who present themselves at a dental surgery for emergency treatment do so as a result of trauma to the upper anterior teeth. Frequently, owing to the distressed state of the patient and the absence of previous contact with the dentist, it is difficult to obtain satisfactory radiographs. The closeness of the apparatus to the face may precipitate uneasiness or fear in the child, and it is sometimes easier to obtain a desired result by keeping the tip of the cone 8 in. from the face—that is, within the focusing distance of the child's eyes.

Fig. 19.—Odontoclastoma in a boy, aged 8 years. Lower left incisor region. $\overline{123}$ are unerupted, and the retained $\overline{bc}$ show a crescentic resorption of their roots. The radiolucent area between $\overline{b}$ and the unerupted $\overline{2}$ is cystic, and fan-like spiculated bone is growing into it.

If the X-ray examination is to establish the presence of gross conditions or the absence of teeth, it is not necessary to undertake a full-mouth survey. This information can be obtained with a dental apparatus by four exposures; these are, left and right oblique lateral projections, an upper anterior occlusal view, and a lower anterior occlusal one. The recently developed techniques of rotography (*Fig.* 22) and pan-oral radiography will also give this information with reduced exposure.

In orthodontic practice, in addition to lateral skull (*Fig.* 23) and postero-anterior views, a full-mouth survey is often requested. The necessity of the latter can sometimes be obviated by having two additional extra-oral views; these are left and right rotated postero-anterior projections

Dental X-ray examination, if undertaken circumspectly, correctly calculated, and under conditions of the greatest protective measures, produces extremely small radiation.

There is no conclusive evidence that, with our modern apparatus, radiation causes any retardation of dentition or facial development,

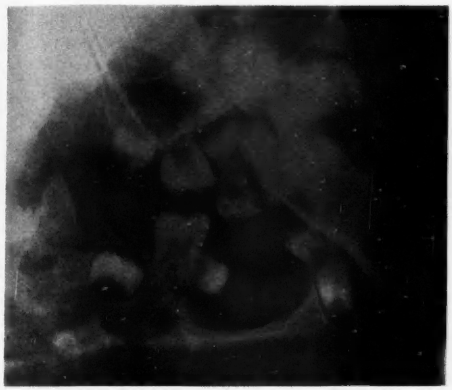

Fig. 21.—Girl, aged 8 years. Unerupted $\overline{5}|$ completely enclosed in a large dentigerous cyst. The unerupted tooth is lying in the horizontal axis of the mandible, with its distal end against the $\overline{6}|$. $\overline{4}|$ is unerupted and displaced mesially and above the unerupted $\overline{3}|$.

or that the tooth germ becomes involved with absence of or delay in root formation, or that there is any development of abnormal dentine in the pulp chamber. Dosage to the individual reproductive organs is certainly negligible. Special studies have been made with the permissible radiation dose, and it would appear that no radiation danger need be feared if a full-mouth X-ray examination is made of the same child every 6 months for 6 consecutive years.

Bearing in mind that the child may be subjected to X-rays for other reasons, it is advisable to outline an indication of procedure for regular X-ray examinations. Complete full-mouth surveys at six-monthly, or even yearly, intervals are not usually necessary. The need should be dictated largely by the clinical conditions. Regular bite-wing examinations serve a much more useful purpose, but even with this procedure in most cases it is sufficient to re-examine radiographically at yearly intervals.

However, the overriding factor here should be the clinical aspect, and if it is so indicated, bite-wing X-rays may be taken at six-monthly intervals, but as soon as the immediate necessity has passed a longer interval of time should be adopted between examinations.

Fig. 22.—Girl, aged 9 years. Rotograph of the teeth. This technique provides a quick survey of the teeth using a single extra-oral film.

Fig. 23.—Shows a typical case of an Angle's Class II, division 1 malocclusion on a Skeletal II dental base. Note the extreme proclination of the upper incisors and the increased overbite and overjet. There is a postnormal molar relationship.

ABSTRACTS FROM OTHER JOURNALS

Silicate Cements and Pulpal Degeneration

Doubt is cast on the theory that acidity is the main factor in causing pulpal death beneath an unlined silicate filling. It is suggested that due to a considerable acid-neutralizing mechanism the *p*H of tissue fluid is not likely to change greatly due to the acid of silicate cement. The buffering power of tissue fluid and the fact that tooth material is itself soluble at *p*H's of less than 6·5 both assist in preventing the disassociation of ions required to lower *p*H.

To support this view is the observation that in children's teeth, where circulation of tissue fluid should provide a greater anti-acid response, pulpal degeneration is more likely.

Alternative theories blame alumino-phosphates which act as neurotropes and fluoride ions. Aluminium ions, which are known to be astringent and antiseptic, may act as a slow poison affecting the lymphatic and vascular systems of the pulp. The greater circulation in young teeth would aid this.

Another possibility is that silicate materials produce an antigen–antibody reaction, in which case the reaction of the pulp would not necessarily be a function of the quantity of the leach reaching it.—ROYDHOUSE, R. H. (1961), *J. Amer. dent. Ass.*, **62**, 670.

J. R. GRUNDY

Demonstration of the Aetiologic Role of Streptococci in Experimental Caries in the Hamster

This work supports the thesis that caries in rodents is a transmissible disease. This is shown by inducing caries in a strain of "caries-inactive" hamsters by oral inoculation of streptococci taken from a carious lesion in a susceptible hamster.

It was noted that animals of a special strain remained "caries resistant", even when placed on a caries-test diet, while they were kept in cages separate from other hamsters. If, however, they were mixed with susceptible animals at weaning or were infected orally with fæcal material obtained from susceptible animals, then they too became equally susceptible to dental caries. It was considered that caries was initiated by certain streptococci contained within the fæces of the susceptible hamsters, and controlled experiments supported this.

Pure strains of streptococci were produced from plaque scrapings of a single carious molar in a susceptible hamster. In addition 4 strains were isolated from the oral cavity and 2 from the fæces of a caries-inactive hamster. None of the streptococci showed any evidence of proteolytic activity.

In order to label the streptococci for easy identification in a mixed sample they were made resistant to streptomycin before being used experimentally.

The animals were inoculated both by pipette directly into the mouth and by inoculation of the drinking water.

Results.—Those previously "caries-resistant" hamsters that were infected with streptococci taken from the carious molar developed caries comparable with "caries-active" animals. The uninfected controls showed no caries. In contrast to this no caries was evident in a further group that had been contaminated with lactobacilli and diphtheroid organisms, nor with those infected with the six streptococcal strains taken from caries-inactive hamsters.

From these findings it is suggested that caries can be induced in a strain of hamsters not normally susceptible to the disease by appropriate strains of streptococci. Thus, within the limits of the experiment, Koch's postulates are adequately fulfilled.

However, there appears to be a considerable degree of species and strain specificity. Furthermore, the authors regard their findings as re-emphasizing that caries is effected by many contributory factors.—FITZGERALD, ROBERT J., and KEYES, PAUL H. (1960), *J. Amer. dent. Ass.*, **61**, 9.

J. R. GRUNDY

SUMMARY RESEARCH REPORTS

THE INFLUENCE OF THE SUBLINGUAL FOLDS ON THE RETENTION OF THE FULL LOWER DENTURE

By **W. ALAN LAWSON, M.S., B.D.S., F.D.S. R.C.S.**
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THE most important requirement for full denture retention is a very thin fluid film between denture and supporting epithelium, with a very narrow meniscus around its entire border. To achieve this, the whole border of the denture should be placed in contact with soft displaceable tissue against which a seal can be established. The anterior lingual border of the lower denture, however, is related to mucosa which moves under the influence of adjacent muscles. Contact between denture border and mucosa therefore tends to be intermittent, and the seal is lost.

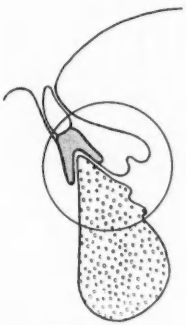

Fig. 1.—Loss of contact at lingual flange on lowering of tongue.

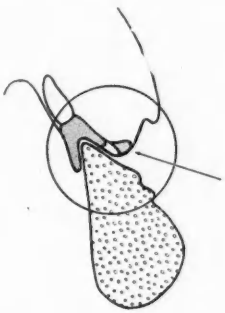

Fig. 2.—Tongue raised. Seal maintained by mucosa of floor of mouth.

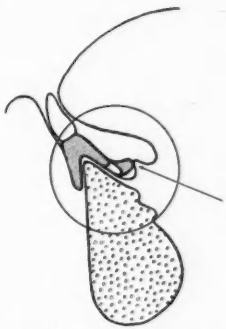

Fig. 3.—Tongue lowered. Seal maintained by sublingual fold.

The anterior part of the floor of the mouth is normally in its lowest position when the tongue is relaxed with its tip resting on the posterior surfaces of the lower anterior teeth. It is at its highest level when the tongue tip is curled upwards and backwards.

The anterior lingual border can be extended downwards no further than the mucosa in the floor of the mouth will permit when it is at its highest level. Any further extension would result either in ulceration of the mucosa or displacement of the denture. When placed in this position the retention will be satisfactory while the tongue is raised but, as soon as it is lowered, contact and seal will both be lost (*Fig.* 1). This difficulty can frequently be overcome by extending the border backwards towards the sublingual folds. This extension should be formed while the floor of the mouth is raised (*Fig.* 2) and should be just large enough to allow its posterior border to contact the sublingual fold when that structure moves forward when the floor of the mouth is relaxed (*Fig.* 3). The seal will then be maintained by contact between the floor of the mouth and the lower surface of the denture border when the tongue is raised, and between the sublingual fold and the posterior edge of the denture border when the tongue is relaxed. The degree of success obtained will depend upon the size of the sublingual fold.

Papers read before the B.S.S. Prosthetic Dentistry at the meeting held on March 28–9, 1960.

DISCUSSION

Mr. Bates expressed his interpretation of technique described in the paper as producing flanges similar to those described by Sir Wilfred Fish. He recommended the use of the closed-mouth impression technique and suggested that muscular control was the most effective element in retention. Professor Mack referred to muco-seal technique, and asked if the extensions suggested by the speaker were well tolerated. He suggested also that composition was not a very suitable material for the impression. Mr. MacGregor questioned the effect of the retraction of the tongue in closure of the oropharyngeal isthmus, the possibility of pooling of saliva, and interference with the sublingual and submaxillary salivary glands. Mr. Lawson, in replying, agreed that the closed-mouth impression technique was effective, but considered that the technique was immaterial provided that the flanges could be properly designed. He pointed out that the flanges proposed by Sir Wilfred Fish were much more posteriorly placed and he considered they were impractical. The design the speaker had described he regarded as an improvement on the muco-seal technique. The flange did sometimes limit protrusion. The posterior position of the tongue could not be regarded as a functional one, and the re-adoption of the anterior position produced a dramatic improvement in retention.

RESEARCH ON MODELLING AND BASEPLATE WAXES

A PRELIMINARY REPORT

By R. EARNSHAW, M.D.Sc., Ph.D., and D. C. SMITH, M.Sc., Ph.D., F.R.I.C.
Department of Prosthetics, Turner Dental School, University of Manchester

An investigation is being made of some physical properties of twenty-two commercially available modelling and baseplate waxes. Flow tests, cooling curves, and moulding tests have been made on all waxes. A planing test, to assess the carving properties of the waxes, is being developed.

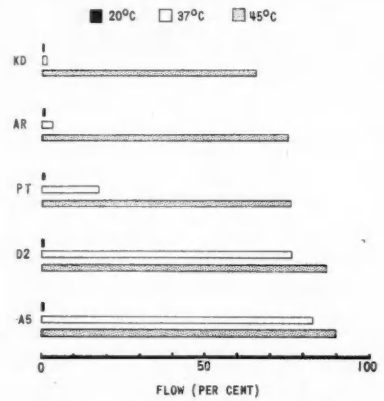

Fig. 1.—Results of flow tests on five waxes: KD, Kemdent Dominator; AR, Ash Rational; PT, Portland Toughened; D2, D.M. Co. No. 2 Toughened; A5, Ash No. 5.

1. Flow Tests.—These were made at 20°, 37°, and 45° C. Specimen preparation and conditions of testing followed the American Dental Association Specification No. 4 for inlay wax. Flow values at 37° and 45° C. are of particular interest. The former gives a measure of the resistance of the wax to deformation in the mouth, and should be low, while the latter gives a measure of ease of moulding, and should be high.

Fig. 2.—Cooling curve for D.M. Co. Service Toughened Wax.

The results of these tests on five of the waxes are shown diagrammatically in *Fig.* 1.

Kemdent Dominator and Ash Rational were in fact the only two waxes, of all twenty-two tested, which had a satisfactorily low flow at mouth temperature. The flow of Dominator was lower at 45° C. than all the other waxes, and clinical experience shows that this is a difficult wax to manipulate.

2. Cooling Curves.—A typical time–temperature cooling curve is shown in *Fig.* 2. Most of these curves showed two major arrests, the first one sharply defined, at about 55–60° C., and the second one, less sharply defined, at about 40–45° C. Above the first arrest the wax would be fluid, and below the lower arrest all constituents would be solid (though the wax would still be soft).

During these tests the opalescence temperature was also noted. This was the temperature at which the molten wax ceased to be transparent and took on a milky or opalescent appearance. It indicates the temperature at which the constituent with the highest melting-point solidified.

In most cases the opalescence temperature was only about 1° C. above the first arrest, showing that there was present no appreciable quantity of any constituent with a melting temperature higher than this; however, Dominator became opalescent at 156° C., and eight other waxes became opalescent, or at least developed a definite cloudiness, at about 75° C.

3. Tests of Moulding Properties.—Moulding properties were assessed in two ways:—

a. Bend Test.—Strips of wax $\frac{1}{4}$ in. wide and 3 in. long were bent round a $\frac{1}{8}$-in. mandrel, and the angle measured through which the wax would bend before cracking occurred. This test was carried out at 15°, 25°, and 35° C. At 35° C. all the waxes except Dominator would bend through 180° without cracking.

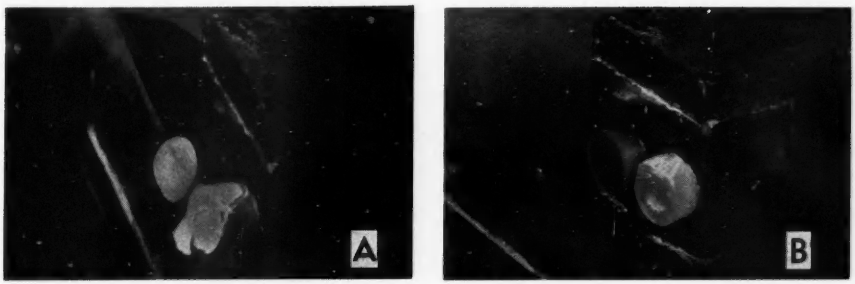

Fig. 3.—Planing test on Kemdent Dominator (nearer) and Ash Rational (further). A, Making the cut; B, The resulting surface on the specimen.

b. Moulding Test.—Sheets of wax were softened and moulded on a non undercut edentulous maxillary cast by means of a counter-die, both made of artificial stone. The test was carried out at 35°, 40°, 45°, and 50° C. Five of the waxes were too close to the molten state to be moulded at 50° C.; all the waxes moulded satisfactorily at 45° and 40° C., although some were stiffer than others; at 35° C. seven of the waxes cracked and most of the others were very difficult to mould.

4. Planing Test.—In this test, slices are cut from specimens of the waxes, in a rocking microtome, and the nature of the cut surface noted. *Fig.* 3 shows this test being made on specimens of Dominator and Rational. It can be seen that Rational carves smoothly, while Dominator shows flaking and chipping.

DISCUSSION

Mr. Saunsbury commented that dental waxes were seldom used with due respect for their properties. The speakers' data on flow properties illuminated the frequent finding that "chewed in" patterns on bite-raising appliances were not accurate. He wondered to what extent flow error and elastic recovery contributed to

poor reproducibility of condyle path registrations. Mr. Anderson queried the use of 35° C. in the tests instead of 37° C. and inquired if any correlation had been observed between hysteresis and flow. Mr. Everett asked if there was any possibility of developing a wax that would be transparent when solid. Mr. Lawson commented on the disadvantages of the large dimensional changes in waxes.

In reply, Dr. Earnshaw stated his opinion that the presence of carnauba wax in correct proportion should eliminate troubles arising from flow and elastic recovery. Tests were carried out within the range 35–37° C. No hysteresis effects were assumed. So far as is known, a transparent wax did not seem a likely product. Suitable combination of waxes made possible a great reduction in dimensional changes.

POROSITY IN CHROME COBALT CASTINGS

By **T. C. GRATY**, B.D.S., L.D.S.
School of Dental Surgery, University of Birmingham

THE work reported consisted of casting a series of specimens of chrome cobalt and gold alloys with a view to assessing the significance of sprue reservoirs and sprue diameters in relation to defective castings. With this in view, two specimen sizes, one approximately twice that of the other, have been used with sprue diameters of $\frac{40}{1000}$, $\frac{1}{16}$, $\frac{1}{8}$, and $\frac{3}{16}$ in., in each case with and without reservoirs. The results have not been highly conclusive, but have tended to give the impression that sprue diameter is of more significance than the presence of a reservoir on the sprue. There has also been a considerable tendency for pipe formation in the larger-sized chrome specimens, and a possible explanation for this may well be the differential cooling rate from the much higher casting temperatures in use with chrome alloys. This study is continuing.

DISCUSSION

Mr. Wesley Johnson agreed that the conclusions presented in the report were now generally accepted, though little work had been done on the specific consequence of special dental processes. He enumerated the causes of porosity as gaseous (absorption or reduction), back pressure, non-metallic inclusions, and shrinkage. He referred to the data presented by Thompson and Hutchinson supporting their condemnation of reservoirs, and asked if the speaker had assessed the importance of the distance between casting and reservoir. His own opinion was that this should be as short as possible, but that larger sprues, few in number, in current usage, were themselves reservoirs. Mr. MacGregor commented that increase of mould temperature increased porosity. Mr. Watt referred to work by Geddes and Howie, who found that differences in technique had no effect on concentration of carbides. He pointed out that the degree of porosity detected by X-ray examination varied with the intensity of radiation. Mr. Smith suggested that specific gravity determinations were the best means of evaluating porosity. He thought that all those examples shown were probably due to contraction. In his view, a critical dimension was the diameter of the sprue connecting the reservoir to the casting, which should be as thick as the casting itself.

In reply, Mr. Graty said that the sprues he used were $\frac{1}{16}$ in. in diameter and that the slides he presented were of surface preparations.

ALL-ACRYLIC PARTIAL DENTURES

By Professor **A. O. MACK**, L.D.S. R.C.S., M.D.S.
Sutherland Dental School, University of Durham

THE report is concerned with the problem of constructing simple atraumatic partial dentures in acrylic resin. Various designs are considered and a technique is described for the construction of a denture with relieved gingival margins and a foiled fitting surface.

Experimental evidence is presented which indicates that:—

1. The relief of the gingival margins and carrying the acrylic resin base above the survey line lingually and palatally gives adequate resting.

2. The adhesion of the denture is slightly improved by foiling the surface of the model prior to processing the denture.

The results obtained from a survey of 87 patients wearing dentures of this type for periods of 7–12 months indicates that these dentures give rise to minimal tissue damage.

DISCUSSION

Mr. MacGregor thought that the benefits claimed as due to the design might just as likely be due to good oral hygiene. He could not agree that adequate incisal support could be obtained other than by rests, especially in the special circumstances in the lower jaw. Mr. Gimson spoke of the damage resulting from raised bites and by the persistent wearing of a partial denture long after it had ceased to fit. He strongly advised the renewal of partial dentures after a limited period of use. He raised the query that the use for support of the palatal and lingual area of the teeth above the survey line might cause outward movement of the teeth. Mr. Everett asked if the speaker had experience of the Every type of denture design. Professor Ganly said that for eight years he had made extensive use of the Every type of denture design and considered it highly satisfactory, though it had the defect of weakness. Professor Mack replied that he agreed that over-prolonged use of a partial denture was very damaging. He had no personal experience of the Every designs.

THE USE OF COLD CURING ACRYLIC FOR BASEPLATES

By Professor A. O. CHICK, Ph.D., M.D.S., L.D.S. R.C.S. (Eng.)
Royal Dental Hospital, London

Professor Chick showed a short film made by Dr. Eric Scher illustrating a method of making acrylic bases for bite blocks, etc., from cold curing resin.

The dough is squeezed into a sheet of the required thickness between metal plates; the appropriate shape is cut out and swaged on to the model by means of a rubber pad that applies the pressure required during polymerization.

DISCUSSION

Professor Osborne referred to a monograph by Ostal, of Oslo, on the compression of the oral tissues in bite recording. He suggested the addition of 50 per cent by weight of french chalk, which has the effect of reducing the tendency of the standard cold cure resins to spring away from the former. Mr. Storer quoted his own experience with N.H. plastics. Dr. Earnshaw commented on the sharp setting of N.H. plastics. Mr. Watt commented on his own use of epoxy resins and the reduction of distortion by a "painting on" method of fabrication. Mr. Nairn expressed his distrust of the rigidity of bases of the thickness described.

In reply, Professor Chick said that he had found that the addition of french chalk weakened the base plate, and that he did not experience much distortion. He had not found the N.H. plastics satisfactory. The thickness he used was adequate provided poured wax rims were used.

THE RELATIONSHIP BETWEEN THE TONGUE AND THE POSTURE OF THE MANDIBLE

By S. FRANCIS FISH, F.D.S. R.C.S. (Eng.)
London Hospital Dental School

A PRELIMINARY report was given of evidence that the rest position of the mandible is related to the posture of the tongue in its respiratory function. This hypothesis is based upon the facts (1) that the mandible is part of the suspensory mechanism of the tongue, and (2) that the proximal part of the tongue has as one of its functions that of completing the anterior wall of the pharynx, and it is active in this function when the mandible is in the rest position.

This association between tongue and mandible provides a reason for the relative stability of the rest position and also has the advantage of explaining it in terms of a fundamental function—that of respiration—rather than in terms of muscle activity.

The effects on the rest position of the removal of teeth were simulated in a number of edentulous patients by removal of the dentures and were studied by means of radiographs taken with and without the dentures in place.

In a random sample of 18 patients it was observed that 7 responded to the removal of the dentures by a protraction of the soft palate and the pharyngeal part of the tongue, no change taking place in the position of the

mandible. In each of these patients the resorption of the alveolar ridge was slight.

Fig. 1.—Showing spreading of the tongue into space created by extraction of teeth.

In another group of 8 the common features were raising of the mandible and a marked degree of resorption, no change being seen in the position of the soft palate or pharyngeal part of the tongue.

Taken together with the common observation that removal of the teeth is followed by spreading of the tongue (*Fig.* 1), it was suggested that it is through this alteration of the oral part of the tongue that the rest position of the mandible is influenced. When the alteration is small, the posture of the tongue is so altered that less of the tongue takes part in the pharyngeal function, but the palate and the tongue still maintain a seal at a slightly more anterior site than before. When the alteration is large, as when the removal of the dentures represents the removal of a large volume of tissue from the oral cavity, the necessary adjustment cannot be brought about by the tongue, for in doing so the performance of its pharyngeal respiratory function would be prejudiced and, instead, the volume of the oral cavity is itself reduced by raising the mandible.

DISCUSSION

Mr. Newton asked if the speaker implied a rejection of genetic determination of the rest position. He referred to Osborne, Brill, and others, who described variation of the rest position with general bodily position and upon removal of the teeth. Mr. Franks spoke of his own observations on the variation in the rest position with bodily position. Mr. Watt asked what precautions were taken to ensure the adoption of the rest position and to guard against the effect of variations due to changes in the general physiological state. Mr. Fish replied that his suggestion did not deny genetic determination of the basic posture, but sought merely to suggest a relationship between a posture and a basic function. The patients were carefully rehearsed in the adoption of the rest position before application of the cephalostat. It was considered that the shortness of the interval between the two exposures removed the need to consider physiological variations.

INTERIM REPORT ON THE INVESTIGATION INTO ROOFLESS DENTURES

By **A. E. EVERETT**, L.D.S. R.C.S. (Eng.), and **G. MacL. RITCHIE**, L.D.S. R.C.S. (Eng.)
University College Hospital Medical School, Dental Department

THE indications for and advantages of roofless or palateless full upper dentures were given, and of the oral conditions predisposing to successful retention and stability.

An interim analysis of 73 cases completed between July, 1959, and March, 1960, at University College Hospital Medical School, Dental Department, was presented, with consideration of the principles and methods required for success, including additional retentive devices. This was illustrated by slides of a number of mouths and cases.

The preliminary conclusions drawn were that:—

1. The percentage of success to be achieved by this design is considerably higher than that previously expected.

2. Successful results may be achieved with mouths not generally considered suitable for this type of appliance, and in some cases in

the presence of circumstances previously considered definitely unsuitable.

3. There are a number of advantages to be gained, not obtainable with the conventional full upper denture.

4. Interference by the anterior teeth with the zone of action of the orbicularis oris muscle should be avoided.

5. Balanced occlusion and articulation, and precise construction, are more particularly essential to offset the loss of palatal coverage and utilize to the full the remaining retention.

DISCUSSION

Mr. Hamish Thompson expressed scepticism that the findings reported were a result of the factors discussed by the speaker. He suggested that the qualities of the peripheral musculature and the behaviour of the tongue were some likely causes. His opinion was that no particular importance could be attached to any position of the posterior margin other than on the junction of hard and soft palate. Professor Chick asked if any valve action retention could be attributed to this design.

Dr. Fox asked if the speaker had any experience of retention by means of spring elements into the buccal undercuts of the tuberosities. Mr. Zamet strongly recommended the palateless design, and said he frequently used it.

Mr. Everett agreed with Mr. Thompson that the results were surprising, but reiterated his reasoning. He had had little experience with tuberosity spring retention and was of the opinion that no special valve action was to be observed. He added that, in those cases in which the palateless denture showed poor retention, this was immediately improved by the addition of the palate.

DENTURE CLEANSERS

By **D. C. SMITH**, M.Sc., Ph.D., F.R.I.C.

Department of Prosthetics, Turner Dental School, University of Manchester

A GENERAL study of commercial denture cleansers has been made from two aspects: (1) the possible corrosive or other deleterious effects on the denture material, and (2) the efficiency of denture cleansing. In this investigation the first aspect was of greater importance.

Twenty cleansers have been examined. They were classifiable into three groups:—

1. Cleansing by abrasive action only.
2. Cleansing by chemical means.
3. Cleansing chemically and abrasively.

The second group was the largest.

Tests carried out so far include a partial analysis and examination of general properties, estimation of their effects on specimens of acrylic denture base material, and preliminary determinations of cleansing action on clinical dentures.

In group 1 three representative powders were examined. These materials were mild abrasives, probably containing chalk or calcium phosphate with some silica flour. The abrasive action on glass, as in the test for tooth-pastes (Souder and Paffenbarger, 1942), was small, but estimation of this effect was difficult since, in practice, both the method of application and the applicator influence the results (Anthony and Gibbons, 1958). Since even a mild abrasive action may be harmful eventually, no further study of these materials was undertaken.

In group 2 one alkaline hypochlorite, eight alkaline peroxides, and six dilute acid materials were examined. Clear and pink specimens of an acrylic denture material known to be stable under mouth conditions were treated daily for a year with these cleansers according to the instructions and otherwise stored at 37° C. in water.

Close visual examination revealed little deleterious effect save that with some oxygen cleansers it was possible under certain conditions to produce some crazing. None of these cleansers was completely successful in removing heavy calculus deposits by simple immersion.

There were no materials specifically in group 3, but brushing action was advised with some of the chemical cleansers. The undissolved solid in such cases would produce a mild abrasive action.

None of the materials examined were wholly satisfactory as cleansers, although little

deleterious effect on the particular denture material used was found. This work is being extended to other denture materials, however, and further work on cleaning efficiency is contemplated.

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SOUDER, W., and PAFFENBARGER, G. C. (1942), *Physical Properties of Dental Materials*. National Bureau of Standards Circular C433. Washington.

DISCUSSION

Mr. Watt spoke of work he had done on cleansers and expressed his agreement with the speaker's findings. Mr. Anderson spoke of queries he had received about the possibility of employing a silicone wax finish. He commented upon the use of Parozone, the domestic cleaner, on dentures by some patients.

Mr. Storey asked if the speaker had encountered cases in which irritation could be related to the use of particular cleansers. Professor Osborne said that he had observed that the teeth of dentures upon which the new formula Steradent was used became transparent. He wondered if the crazing sometimes observed could be due to the use of any particular cleanser.

In reply, Mr. Smith said that Parozone was a hypochlorite of the same nature as Dentural. He had not seen any cases in which a denture cleanser could be established as the cause of irritation, though this was possible with the perborates. He had not observed damage of the type referred to.

BRUXISM, A CLINICAL AND ELECTRO-MYOGRAPHIC STUDY

A number of patients (34) with severe bruxism were studied clinically and by use of electro-myography. The clinical examination and history took account of psychic or physical stress as well as the usual factors. The electromyographic recordings were made by electrodes placed in 24 positions which produced an 8-channel tracing. Comprehensive records were made during 16 different jaw movements or positions.

After sufficient data were obtained the occlusion of each patient was adjusted and the recordings repeated.

It was concluded that any type of occlusal interference allied with nervous tension can initiate bruxism and, if present, bruxism may be eliminated by occlusal adjustment.—RAMFJORD, S. P. (1961), *J. Amer. dent. Ass.*, **62**, 21.

J. R. GRUNDY

DENTAL SURGERY DURING CONTINUOUS ANTICOAGULANT THERAPY

It is maintained that dental surgery involving surgical procedures can be performed with safety on patients undergoing continuous treatment with anticoagulant drugs.

These drugs are in common use to prevent further formation of blood clots in patients suffering from such diseases as coronary thrombosis, certain types of strokes, thrombophlebitis, arteriosclerosis, etc.

Twenty patients undergoing prolonged anticoagulant therapy showed no unusual hæmorrhage after a total of 45 dental surgical procedures. All wounds were dressed with an absorbable gelatin sponge prior to suturing.

It is suggested that far more serious consequences than post-extraction hæmorrhage may follow if anticoagulant therapy is discontinued prior to operation and during the healing stage. Many instances are quoted from the literature such as recurrent embolism in 12 out of a group of 17 patients treated in this way.

To encourage local clotting the following steps are recommended: (1) 2 per cent Lidocaine hydrochloride without vasoconstrictor as the local anæsthetic; (2) Severance of the gingival attachment with a sharp blade prior to extraction; (3) Continuous pressure on the involved tissues throughout the operation; (4) Placement of absorbable gelatin in each socket; (5) Multiple sutures applied with tension; (6) Heavy biting pressure immediately after operation; (7) A course of external ice packs for the subsequent 48 hours.—BEHRMAN, S. J., and WRIGHT, I. S. (1961), *J. Amer. dent. Ass.*, **62**, 172.

J. R. GRUNDY

PRESENT-DAY INSTRUMENTATION IN PERIODONTAL THERAPY*

By J. O. FORREST, L.D.S. R.C.S.
Department of Preventative Dentistry, Guy's Hospital

PERHAPS no greater advances have been made in periodontal therapy than have taken place in the last decade. Developments in technique have been matched by the design and construction of new instruments which have enabled the periodontal surgeon to operate with greater facility and comfort both for himself and, more important, for the patient. The concept of periodontal therapy now embraces measures to allow the attachment apparatus to function efficiently and to be readily cleansable, as well as to eliminate inflammation. During surgery, bone is being exposed more freely, and, if necessary, shaped so that the contour is more acceptable. The teeth themselves are not considered inviolate, and changes in contour of the enamel, cementum, and dentine are frequently made, so that proper physiotherapy can be carried out. These developments have led to research on new non-irritant surgical packs because of the extensive bone exposures, and to the introduction of new rotary instruments for contouring the hard and soft tissues.

We may subdivide our therapy: (1) Initial preparation—Recording original condition; Diagnosis and prognosis; Scaling. (2) Curettage. (3) Oral hygiene and home care. (4) Surgery—(*a*) Soft tissues; (*b*) Hard tissues.

The use of instruments is a very personal one. There are at least three variables, the operator, the patient, and the type of lesion involved. Environment, too, may influence choice of instruments, i.e., whether in hospital, private surgery, or operating theatre. Therefore, the instruments which will be described are those used by the author in private practice with more or less success.

INITIAL PREPARATION

Recording and diagnosis are included as a part of therapy because, during treatment, we must frequently refer to our original records so that a proper estimation of progress can be made.

For examination, a mirror, probes, tweezers, and a good light are essential. The probes chosen are the sickle-shaped, the Cross calculus probe, and the flat, calibrated Williams probe.

Essential for Proper Records.—(1) Written description and measurements; (2) X-rays.

Photographs, preferably in colour, are desirable, but not always possible.

Description and Measurements.—There is a real need for a chart and charting method which are comprehensive yet sufficiently simple to be used in practice. None has yet appeared, although that of Galloway (1960) shows promise.

X-rays.—Many cases are nowadays X-rayed with radiopaque points to indicate the extent of the lesion. Silver points, as described by Hirschfeld (1953), gutta-percha points, and other radiopaque materials have been used and all present problems since they tend to curl up or to lie obliquely, and are not easy to handle.

In hospital practice, where radiographs are taken by ancillary workers, it is virtually impossible to arrange for the use of any sort of marker. In addition, there is always the fear of loss of points. The writer has modified a set of Hirschfeld points by drilling a ten-thousandth-inch hole at each 2-mm. intersection. A fine terylene thread is attached at the coronal end of each point. The depth of the pocket is first estimated with the Williams calibrated probe, and having selected the corresponding (or larger) silver point, a piece of 0·008-in. soft copper wire is pushed through the hole at the measured pocket depth. This is bent to follow the contour of the gingival margin when the point has been inserted into the pocket. The danger of loss has been minimized by the attached cord, and the points are easier to handle. Fewer points are

* Given at the meeting of the British Society of Periodontology held on Jan. 9, 1961.

required as, provided that the interdental spaces will allow insertion, the larger point may always be used. By doubling the end of the wire over the lingual gingiva, the three-dimensional radiographic technique described by Orban and Orban (1960) can be used (*Figs.* 1 and 2).

Photography must be briefly mentioned here. Nothing gives the dentist, or patient, a better indication of progress than a good photograph, but this is usually a costly and time-consuming process because of the close-up work involved. The very simple box-type camera recently introduced for dental photography has considerable merit, especially for the less-than-keen photographer, as it offers almost consistent results with the minimum of adjustments and controls.

Fig. 1.—Diagnostic point with labial and lingual wires not in alinement. Angulation of tube not correct.

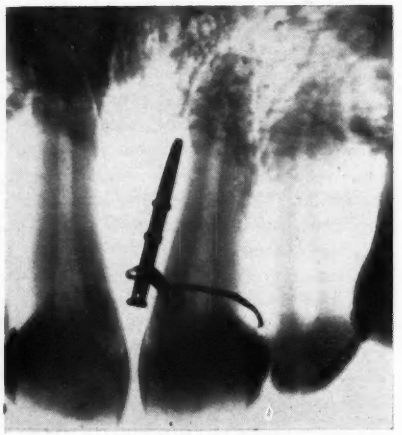

Fig. 2.—Labial and lingual wires superimposed. X-ray tube correctly angled. Depth of pocket is from tip of point to attachment of wire.

Scaling.—

Coronal Scaling.—Given a careful operator and a tolerant patient, coronal calculus may be removed by using almost any instrument in the dental cabinet. By this is meant that coronal scaling depends more on technique than on instruments, and has for its object the thorough removal of all deposits without damage to tooth substance. A questionnaire was sent to a number of periodontists at random and the replies were overwhelmingly in favour of the following four instruments: Watch-spring or chisel type (Ash Gl. or Zerfing); Jacquettes 1, 2, and 3.

The use of these has been described (Emslie, 1957), but it is felt that the possibilities of the watch-spring scaler are still insufficiently appreciated and that a considerable portion of the coronal scaling can be done by judicious use of this instrument in a *sharp* condition. Periodontal therapy can only be performed satisfactorily with sharp instruments, which means that one of the first lessons to be learned is sharpening technique. A stone must be available all through instrumentation for sharpening instruments as required. It is helpful in teaching to stipulate that a sharpening stone must be laid out ready for use when a student presents his work on a patient for inspection.

The possibility of manufacturing these instruments with tungsten carbide tips to prolong sharp life has been explored, but has not produced acceptable instruments to date. An alternative is to use vanadium steel, which is harder than the normal stainless steel used for instruments and which keeps its edge longer. A set of modified Morse-type scaler tips of the Jacquette type has been produced commercially. These tips are numbered 4A

and 5A. They are smaller than the conventional Jacquette blades and may be easily introduced into the gingival crevice. They have been used approximately eight times between sharpenings. The edges appear to withstand boiling water better than does stainless steel.

The advantages that may result from use of this type are:—

1. Longer time between sharpening.
2. Cheap replacement of tip if fractured or worn out.
3. Easy replacement of tip with a finer one (No. 00) for intrabony pocket curettage (Carranza, 1960).

The disadvantages are:—

1. Bulky handles may complicate storage.
2. Tendency for corrosion of insert inside handle.

In the United States of America the Zerfing chisel instrument is commonly used where the watch-spring scaler would be used here. One disadvantage as compared to the watch-spring is that the blade broadens very rapidly to the shank and it is difficult to insert it between closely set teeth. Also, the flexibility which is so important in scaling curved surfaces is lacking. It should be mentioned, in passing, that there seems to be a return to favour of the large sickle scalers, and these are being recommended more frequently for gross coronal scaling (Wade, 1960). Of these types, the Ivory CI scalers 2 and 3 are valuable, especially during gingivectomy, when gross deposits may have to be removed with speed.

Subgingival Scaling and Curettage.—

Hard Tissues.—There is no doubt that the currently available tungsten carbide hoes are by far the most satisfactory instruments of their type obtainable anywhere. They retain their sharpness for many months, a considerable advantage which is particularly desirable with hoes because of the sharpening difficulties associated with these instruments. The most notable feature about them, however, is the minute blade size as compared with the standard hoe, and this is the major factor which contributes to their success as probably the foremost advance in hand instrument design in the past decade.

Curettes.—With the foregoing in mind, experience with the tungsten carbide curettes has been disappointing. Comparing these with the conventional Gracey curettes it is found that there is: (1) Lack of spring; (2) Considerably greater bulk.

Also, in this operator's experience, the tungsten carbide curettes do not retain their sharpness for much longer than the conventional types. Although the possibility of the user sharpening tungsten carbide instruments has been mentioned in the literature (Wade, 1960), the information available indicates a cost of around £150 for a special diamond wheel for this purpose. As students are now using some tungsten carbide instruments, a personal record was kept of the factory sharpening times (because any prolonged sharpening time would mean extra purchases and cost for the student). The minimum time noted to date has been three weeks and the maximum has been seven weeks. The approximate cost of sharpening each instrument has been five shillings. This seems to indicate that the economical avenue of investigation, at least for students, is towards the adoption of Morse-type interchangeable tips for scalers and curettes. These can be sharpened and cost only four shillings to replace.

However, until these are developed, the Gracey curettes of the conventional type are still advocated. They can be sharpened by the use of the hand "pencil" Arkansas stone or the mounted, engine-driven cylindrical ruby stone.

The curettes, of course, are used for both soft- and hard-tissue planing. It is advisable to reserve separate curettes, however, for soft tissues and they should be maintained in an almost razor-sharp condition.

Polishing.—As they may not be easily accessible to rubber cups and pumice, proximal surfaces should be polished, as far as possible, with linen strips. Two grits of 4-mm. wide cuttle-fish strips usually suffice (Moyco coarse and medium).

Rubber-cup polishing is best performed with a specially constructed polishing head. The use of these heads, which are designed mainly for rubber cups, and therefore remove only

residual stain, would encourage the prior removal of deposits by *scaling*, rather than, as sometimes occurs, by attempting to remove the more obvious supragingival calculus with the larger bristle brush in the handpiece.

HOME CARE AND PATIENT INSTRUCTION

This section has been deliberately placed before surgery because of its relationship to instrumentation.

Unless the patient has grasped and will carry out the principles of oral physiotherapy, it is useless to proceed with complicated surgical procedures.

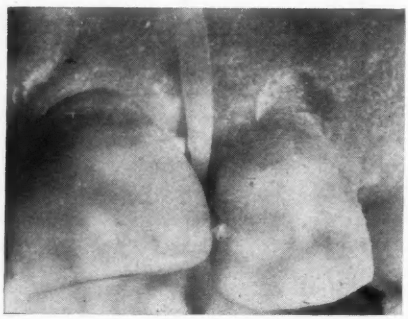

Fig. 3.—Dental tape passed through embrasure.

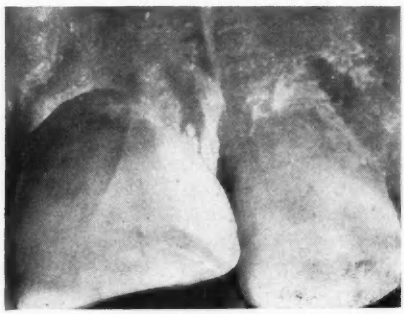

Fig. 4.—Tape twisted and passed back and forth between teeth.

The *correct* instruction in tooth-brush usage is the most important part of our therapy. Indeed, the tooth-brush is the one instrument which is an absolute necessity in every periodontal case. Unless this is emphasized to the patient by an enthusiastic teacher (sometimes almost to the point of forcible persuasion) the rest of the treatment is doomed. Young patients with simple marginal gingivitis are frequently referred for treatment, many with minimal amounts of calculus present, and one marvels at the number who improve after only one visit if care is taken in brushing instruction.

Two types of brushing are taught:—

1. Modified Stillman method. Where there is little or no loss of tissue.

2. Charters method. Where there is tissue loss and some further shrinkage may be desirable, i.e., where wood points would probably be advocated in addition.

Instruction must be a completely personal one, and is rarely successful unless the patient can demonstrate his or her acquired skill. The patient must *always* brush for the teacher at each visit until proved skilful. The problem here has been provision of a brush for each patient. The advent of the replaceable head brush allows immediate instruction, using a new brush head for each patient. The cost of these heads is so low that a considerable quantity can be kept and even discarded at the termination of the period of treatment. The same handle, suitably sterilized, is used for each patient. These brushes are so far only considered suitable for teaching technique, and are not advocated for everyday use.

Use of Dental Floss.—The risk of injury to the gingivæ if dental floss is carelessly used is well recognized. The use of waxed tape (Dentotape) is desirable where the action of the floss is felt to be advantageous (i.e., in close contact cases, sometimes where the alternative might be odontoplasty). The flat tape is passed through the contact point and is then twisted in a spiral and moved buccolingually, clearing the interdental space (*Figs.* 3, 4). It is hoped that the manufacturers of this tape will one day see fit to market it in this country.

Use of Wood Points.—Patients are taught to use Stimudents when soft-tissue loss has occurred, but only after all deposits have been removed.

SURGERY

Soft Tissue.—Pocket marking forceps (Crane-Kaplan type) should be very fine, but with blunt inserts, and should be modified so that the pocket leg will always be parallel to the long axis of the tooth. Many of the types currently available are completely useless owing to their bulk. A pair, right and left, is required.

Knives.—For primary incision some still use a standard replaceable scalpel blade, but owing to the difficulty of obtaining proper angulation, this is not recommended for routine procedure. (However, a No. 15 blade in a standard handle is a good stand-by in case of emergency.)

The Kirkland knives, Nos. 15 and 16, are one's first choice. They cut all round the blade periphery, and they have a point which can be used to sever the interdental tissue. A similar knife is the Goldman-Fox No. 7, usually doubled-ended and lacking the point. Both types are excellent to use in modification of tissue form, as in gingivoplasty. They are then used with a planing or scraping action, and, in fact, it becomes necessary to use other methods of gingivoplasty only when dense fibrotic tissue is present or when bone modification is desired.

The interdental tissue may be cut with the Kirkland knife-point, but the set of knives advocated by Fish is still invaluable, and it is interesting to note that, according to observation and information, they are still used by periodontists all over the world.

Tissue removal is performed with the Goldman-Fox No. 10, where the cutting edge is shaped to fit the root convexity. Small tabs of tissue may be removed with the serrated Stone's scissors, or a 4-in. Iris curved scissors.

In gingivoplasty, where the soft tissue is too dense for knife modification, one may use electro-surgery of the monopolar type. This is not tolerated well by the conscious patient, but in the anæsthetized patient there are considerable advantages (provided that the anæsthetic is compatible) in the hæmorrhage control obtained, and the frequency with which the pack (always of some concern in the unconscious patient) may be omitted.

For gingivoplasty combined with osteoplasty, the Fox Nos. 1, 2, and 3 diamond stones are useful. A water spray is required because of the high engine speeds.

For fine curettage, and removal of the epithelial attachment in intra-bony pocket surgery, a No. 00 tip in the Morse scaler handle can be used. These are very small-headed instruments and may be easily inserted between tooth and bone to the pocket base.

Odontoplasty.—Removal of tooth-tissue when required for improvement in gingival form may be accomplished on accessible surfaces by diamond stones as in osteoplasty. The difficult interdental surfaces, as with closely packed roots, are best shaped with a No. 700 fissure bur (plain cut) in a conventional engine, followed by a flame-shaped finishing bur. The resulting exposed surfaces must be very carefully polished.

SOME NEWER INSTRUMENTS

Calculus-removing Bur for Air-turbine Engine.—This recently introduced instrument (Roto-Pro) has excited some interest. It has been advertised as removing calculus without damage to tooth substance or soft tissue. The bur is of the friction-grip type and is basically pyramidal in shape with a sharp point and six facets.

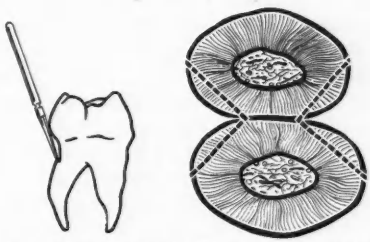

Fig. 5.—Diagram showing manner of grooving of cementum by point of high-speed rotary scaling bur.

Fig. 6.—Diagram of lower incisors in transverse section. Dotted lines show how proximal angles tend to be removed by scaling bur.

In use it has been found that calculus is removed fairly satisfactorily, but at some danger to tooth substance. Because the instrument is rigid, angulation is difficult and the curvatures of the crown do not allow the

blade to be closely applied to the tooth surface. Hence there is a two-point contact, at the tip of the bur and somewhere along the blade (*Fig.* 5). The tip was found to cut very readily into cementum, and even enamel.

The possibility of eliminating this cutting action by removing the tip was tried. Rather surprisingly, the instrument was found to cut even more readily at the now broader tip.

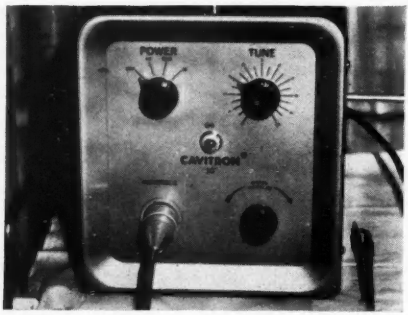

Fig. 7.—Ultrasonic unit; front view of cabinet.

As the instrument was still bearing on this end, the increased linear speed created at the modified tip obviously increased the cutting ability.

On the enamel there is a tendency for discrete and firmly attached portions of calculus to be burnished smooth and left in situ.

When the instrument is used on the proximal surfaces "ridging" may occur (*Fig.* 6). The removal by the instrument of the proximal line angles labially and lingually leaves a bulge below the contact point of the teeth.

It is considered that, until further investigation and possible modifications have been carried out, routine use of this instrument should not be encouraged.

The Ultrasonic Instrument in Periodontal Therapy.—The first use of ultrasonic energy for a dental cutting instrument was reported by Catuna (1953). Later Oman and Applebaum (1954) reported on the preparation of cavities in teeth and suggested certain advantages, especially in patient acceptance.

Many investigations into the effect of ultrasonic energy on the pulp and periodontal tissues were then commenced.

An early report by Hansen and Nielsen (1956) showed imperfect amelogenesis in erupting guinea-pig incisors which had been subjected to ultrasonic cavity preparation. However, later work by Zander (1958), Zach and others (1957), and Friedman and Solomon (1956) demonstrated reactions which were similar to those observed in conventional cavity preparation.

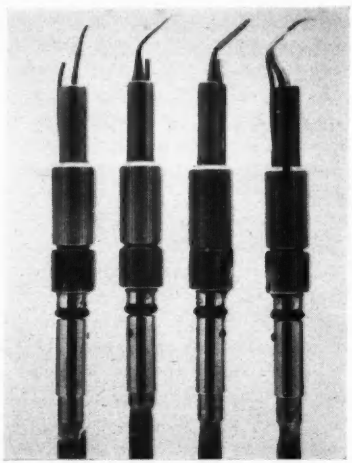

Fig. 8.—Set of ultrasonic inserts (third instrument from left has been modified for curettage).

The effect on the periodontal membrane, alveolar bone, and gingivæ was studied by Mallernee (1958). He reported that histologically the experimented tissue showed no abnormal variation from the controls. These results were confirmed by Knapp and Bernier (1959). The use of ultrasonics in periodontal treatment has been reported by Wilson (1958), Ewan and Tascher (1958, 1959), Goldman (1960), and McCall and Szmyd (1960). These were based on the use of a unit designed primarily for scaling. All demonstrated favourable results.

The portable unit, as supplied, has four main components: An electronic generator, a handpiece assembly, a set of interchangeable scaler points, and a foot control.

The generator and water systems are housed in a metal cabinet $10 \times 9 \times 12$ in. There is a

quick-coupling connexion to the mains water-supply. As the unit is wired for 115 volts 60 cycles, an additional transformer is supplied for 240-volt 50-cycle sources.

The front of the cabinet shows three controls (*Fig.* 7):—

Top left: Power selector dial. This switches the circuit on and off and selects "Low", "Medium", or "High" energy levels or amplitudes of vibration.

Top right: Tune control dial. Sets instruments into proper vibration. The correct frequency for optimum operating efficiency is selected on the scale from 0–10.

Centre: Pilot light.

Lower right: Water-flow adjustment knob.

The generator converts the normal mains current to a frequency of 25,000–29,000 cycles per second. This is converted at the handpiece to mechanical vibrations of the same frequency and these vibrations are transmitted to the tip of the instrument. The tip has an amplitude or movement range of approximately $\frac{1}{1000}$ in. A water spray is an integral part of the handpiece tip, and when activated a cavitational effect takes place, i.e., the fluid "cold boils", and is vaporized into an accelerated spray (Crawford, 1955).

The scaler tips are made of stainless steel, and the inserts bearing the tip may be sterilized by any of the usual methods with the proviso that temperatures above 250° F. are not used. The tips may be made from any of the conventional types of scaler brazed to the insert or magnetostack. The points usually supplied are: P1, P3, P4, and P11 (*Fig.* 8). P1 corresponds to a chisel scaler; P3 is a large flat chisel; P4 is a flat right-angled blade; P11 is curette-shaped.

Although the makers assert that the instruments may be dull and never require sharpening, it has been found that a more efficient action takes place if the edges are kept reasonably sharp, but there does not appear to be any frequent need for this.

Before tuning the machine, the operator selects the appropriate scaler insert, which is merely pushed home into the handpiece, and then lightly guides the scaler over the surface of the teeth. The warm-water spray flushes the area of dislodged material and this is taken away by the saliva ejector, or other suction apparatus used. A water spray is very necessary owing to the heat which would otherwise be developed.

Because of the amount of water used, a special routine has to be adopted. Patients require a plastic cape and a water-evacuation tube, ideally of the high-volume type (Pelvac, etc.). The head should be kept erect or slightly forward. It is wise to commence operations with the "power dial" set at "medium" for the nervous type of patient. If there is complete acceptance, the setting may be changed to "high", at which level the instrument works at its maximum efficiency.

OBSERVATIONS

1. Patient acceptance. Some 300 cases have been treated in hospital and private practice and approximately 85 per cent prefer the ultrasonic device to scaling with hand instruments.

2. Heavy supragingival deposits and heavy stains, especially in pits, are easily removed. Calculus and debris are flushed away from the area and from the gingival crevice and pocket by the water spray. It is felt that this is less liable to lead to systemic effects than hand scaling especially in "dirty mouths".

3. There is less fatigue for the operator and scaling may generally be continued for longer periods as the patient tends to sit in a more relaxed state with less need to pause for rinsing of debris.

4. Bleeding of inflamed tissues probably occurs as frequently as with other scaling, but is less noticeable owing to the flushing action. The hæmorrhage tends to be of an oozing nature.

5. Cervical overhangs, especially on amalgam fillings, may be removed with the P11 insert. This produces a very smooth surface and considerably less tissue damage than heretofore.

6. Very loose teeth are scaled with ease as no force is used.

7. There appears clinically to be a rapid diminution in size of the inflamed tissues.

8. In this operator's view, there is probably little or no shortening of the time required to perform a thorough scaling. After using ultrasonic instruments, the mouth should be explored very carefully with a probe, and if necessary, there should be a follow-up with hand instruments to remove any residual calculus.

Fig. 9.—Case of periodontitis simplex with deep pockets—immediately following ultrasonic curettage.

9. An initial training period is necessary. The time taken to learn to use the machine with maximum efficiency is at least 2–3 weeks.

10. Ultrasonic scaling has been performed on teeth before and after extraction. No macroscopic damage to tooth tissues was visible, but in some loose teeth with softened cementum considerable cementum loss can be seen on microscopic examination. Similar results have been demonstrated in adjacent teeth scaled by hand.

Acute Ulcerative Gingivitis treated with the Ultrasonic Unit.—These cases are routinely scaled at presentation, with the ultrasonic unit. Those patients with systemic histories have also been treated with antibiotics. All have demonstrated excellent results clinically, with freedom from pain and healing of ulcers in from 24 to 48 hours. There was, remarkably, little or no pain during instrumentation at the first visit. However, too few cases of this type have been treated for any firm conclusions to be drawn, especially as no controls were used. It is possible that gingivoplasty may be performed early in these cases, if required.

Curettage and Surgery.—For treatment of deep pockets the tips P4 and P11 are used. The latter is curette-shaped and will easily enter the deep pockets, removing and flushing out the subgingival calculus. The tip may then be applied to the pocket wall. Goldman (1960) recommends modifying the P4 tip to a blade suitable for stripping the pocket wall.

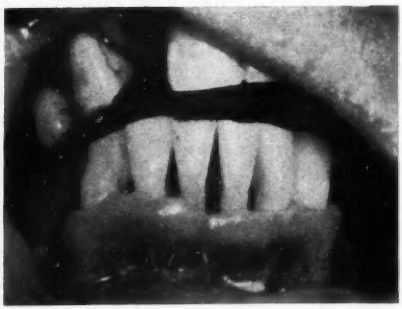

Fig. 10.—Same case as in *Fig.* 9, one week after ultrasonic curettage. There is marked shrinkage of the gingivæ.

This has been used and appears to be very effective clinically. Considerable reduction in pocket depth has been noted in from 48 hours post-operatively (*Figs.* 9 and 10). In flap operations the epithelial lining of the flap is easily stripped, using the modified P4 on the underside of the flap.

Localized fibrous enlargements of the gingivæ have been painlessly removed, using no anæsthetics in most cases, with the same curette tip. The resultant wound was packed sometimes, but in general no pack was employed. No recurrence was noted after 8 weeks in any of the cases.

The action of the blade on soft tissues appears to be a desiccating one. The blade of the instrument is stroked across the base of the enlargement, and the tissue turns white before being severed. This seems to be due to the thermal effects of the ultrasonic vibration. One has to consider whether any undesirable changes have occurred in the underlying bone. However, in all instances, uneventful healing has taken place, and no bone disturbances have been reported in the literature.

The appearance of the cut tissue, especially of hard, dense tissue, shows a smooth, even cut. There is no charring, as with electrosurgery.

Microscopic sections show intact marginal epithelium and a normal appearance of the corium. In the centre of the section away from the cut, normal collagen bundles are visible, but coagulated collagen bundles are seen towards the region of the cut. The nuclei are vacuolated and distorted. In one chronic enlargement of long standing, histologic examination of the removed tissue showed inclusion of bone fragments. The tissue was removed painlessly with no anæsthetic, and healing was uneventful with no post-operative discomfort. There was probably ectopic formation of bone in the fibroblasts at the base of the enlargement, the bony tissue offering little resistance to severance at this point. In these cases there has been no clinical evidence of damage to the underlying alveolar bone.

Curettage of deep intrabony pockets should not be performed if there is any possibility of actual contact between the ultrasonic instrument and bone. The risk of bone damage is certainly greater owing to the large area of unprotected bone exposed to the vibrations and possible heat.

Treatment of Other Lesions.—Pericoronal infections respond well to ultrasonic curettage with the P11 tip. Penetration below the flap to the base of the pocket is usually very easy, and the flushing action of the spray gently removes all the contents. A face mask is necessary in treating cases of this type to avoid inhalation of atomized infected matter.

Residual epithelial-lined sinuses after apical infection were curetted deeply with ultrasonic tips and rapid healing has occurred.

Disadvantages.—

1. Loss of tactile sense inherent in a vibrating instrument. This is compensated for, in some measure, especially when using the P11 tip, by not activating the tip and using it possibly as a conventional curette. Having obtained the "feel" of the deposit the foot switch is pressed and ultrasonic scaling is continued.

2. A considerable volume of water is used. If an efficient suction tube is not available, the mouth quickly fills with water and this is unpleasant for the patient, especially if the head is tilted back. The volume of water flowing is considerably more than with the air-turbine drills, but the newer methods, now being adopted to deal with large quantities of water in air-turbine use, apply just as well to the ultrasonic unit. These include use of low-pressure, high-volume suction apparatus (Pel Vac, Ora Vac, Vacudent, etc.), and construction of similarly functioning apparatus from easily obtainable materials (Morrant and Stephens, 1960).

3. Fracture of tips occurs sometimes (two broke in the first month). This may be initial lack of care and mishandling, but there may be a possibility of metal fatigue (Coombs, 1960). This point is being investigated.

4. Differences in patient acceptance. A few patients (about 15 per cent) do not like the instrument. The alternatives are to abandon its use on the objectors, or to try again under local anæsthesia and/or lower power.

5. Servicing of the unit, should breakdown occur, may be difficult in this country at present.

SUMMARY

Some of the instruments used in periodontal therapy have been reviewed. Suggestions have been put forward for modifications to several of these. Preference has been indicated where a choice of instruments has arisen. A description of ultrasonics, as applied to periodontal therapy, has been given and some results of therapy are illustrated. These results appear to be encouraging to date, and warrant further controlled investigation into the possible benefits and drawbacks to be encountered.

Acknowledgements.—Gratitude is expressed to the following at Guy's Hospital Dental Department: Mr. M. N. Naylor and the Department of Dental Medicine for the histological work involved, and the Department of Dental Photography for many of the photographs and slides.

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TAKING THE IMPRESSION: PRACTICAL TECHNIQUES

Three simple techniques are described using mercaptan rubber-base impression compounds together with commonly used dental impression materials. The mercaptan rubber materials are preferred to the silicone elastomers because of their better shelf life.

1. Alginate Technique.—An edentulous stock tray is used which will just cover the teeth and immediate supporting tissue. This holds adequate material for the area required and at the same time allows easy reseating in the mouth. An unperforated tray using an adhesive for retention gives better uniform anchorage than does the perforated tray. However, either may be used. Compound stops are placed in the tray over teeth not involved as abutments. An impression is then taken of the whole arch using alginate, taking care to seat the tray till the cusps of the teeth concerned contact the compound stops. This prevents subsequent distortion of the alginate when reseated in the mouth. The alginate in the area of the prepared teeth is removed with a knife down to the adhesive on the tray or to the perforations. This area is filled with heavy-bodied rubber material, and in order to avoid air blows an injection-type or light-bodied rubber is injected on to the abutments. The tray is then reseated in the mouth and left for the rubber to set. The impression is then poured immediately.

2. Compound Technique.—A similar stock tray to the above is used, but without perforations. The abutment teeth are covered with moistened surgical sponge, which will serve as a relief area for the rubber impression material. The tray is then filled with softened compound and seated in the mouth. Undercut areas are removed by repeatedly withdrawing and inserting the tray while the compound is soft. The tray is withdrawn and the surgical sponge removed. Retention holes in the compound are made in the bridge area to anchor the rubber base. Rubber adhesives should be avoided as the organic solvent can attack and soften the compound. The bridge area is filled with rubber base and one proceeds as in the alginate technique.

3. Plastic Tray Technique.—The tray is made directly in the mouth using a fast polymerizing plastic tray material. The plastic is fashioned into a tray and handled at the heavy dough stage. The abutment teeth are covered with wet asbestos to give adequate relief area for the rubber material. The tray is then inserted in the patient's mouth and adapted to the bridge area. Undercut areas are again removed by the repeated withdrawal and insertion of the tray. The tray is removed before the heat of polymerization sets in and the patient rinses to remove any free monomer remaining. A coating of rubber adhesive is used to anchor the rubber base material to the tray. The impression is obtained, as before, using heavy- and light-bodied rubber base. The dies and models are cast and subsequently mounted.—O'CONNELL, J. J. (1961), *Dent. Abstr.* (*Chicago*), **6**, 131.

I. D. GAINSFORD

BOOK REVIEWS

A HANDBOOK OF DIFFERENTIAL ORAL DIAGNOSIS. (The Postgraduate Dental Lecture Series.) By MAJOR M. ASH, Jun., B.S., M.S., D.D.S., Associate Professor of Oral Pathology and Periodontia, University of Michigan School of Dentistry, Ann Arbor. $7\frac{1}{2} \times 4\frac{3}{4}$ in. Pp. 234. 1961. St. Louis: The C. V. Mosby Company (London: Henry Kimpton). 48s. 6d.

THE book covers the field of differential diagnosis in oral conditions quite adequately, especially as the evaluation of diseases is made on signs, symptoms, aetiology, and anatomic locations. In the author's own words: ". . . the book was not intended to take the place of standard texts, but to supplement them". For a quick reference the student and practitioner will find it a useful book. It would seem, however, that the cost of this book is excessive when there are no diagrams or photographs such as one would expect to find in a book at this price. There are no references to the literature, a fact which helps to make the text easy to read.

The book is written in a highly individualistic way, and in spite of some omissions and overlapping statements it is recommended to students who are reading for higher examinations in dentistry as supplementary reading to the complete text-books.

H. M.

DIAGNOSTIC STOMATOLOGY. A Clinical Pathologic Approach. By E. CHERASKIN, M.D., D.M.D., Section on Oral Medicine, University of Alabama School of Dentistry, Birmingham, Alabama. $9 \times 5\frac{3}{4}$ in. Pp. $338 + \text{xiv}$, fully illustrated. 1961. New York, Toronto, and London: McGraw-Hill Book Co. Inc. 97s.

THIS book depicts better than any other the view that dental medicine is not a special part of medicine but the whole of medicine looked at from a special point of view. The author is to be congratulated on his courage for writing such a book though, as yet, there are all too few dental practitioners of dental medicine.

Unfortunately, this book is written by a specialist in his field, presumably as a reference book to other specialists, for it is too advanced for the student and general practitioner. The investigations discussed are mostly special laboratory procedures, for this is a book of chemical pathology applied to the diagnostic problems of stomatology.

Individual chapters deal with the physiology and pathology of blood, urine, and saliva, and others deal with tests to detect hormonal and nutritional disturbances and signs of hæmorrhagic diathesis. Quite a lot of basic knowledge is needed on the part of the reader, for there is nothing so simple as how to test a specimen of urine for sugar and albumin prior to giving a general anæsthetic, or how to do a bleeding-time test.

The result of much original and painstaking research by the author is incorporated in the text. Long tables give the results of investigations and these suggest over-investigation in some cases. A rather unrealistic view is taken towards the early detection of oral cancer when the author writes: "The biopsy, though a valuable tool, is not always simple and certainly not inexpensive. Hence, there is still need for a simple and readily available tool for the early detection of oral malignancy. The technique which best meets these specifications at the present time is the use of intra-oral cytologic testing. The procedure is simple (simply smearing an area with a swab), painless, and relatively easy to interpret." In the reviewer's opinion this is a very unsound and dangerous approach to the detection of an oral cancer, for the interpretation of epithelial smears is difficult even in the most experienced hands.

Each section is followed by good illustrative case-histories and abstracts of related original papers. The format is well planned and the book is handsomely printed and bound.

B. E. D. C.

TEXTBOOK OF OPERATIVE DENTISTRY. By E. L. Hampson, M.D.S. (L'pool), F.D.S. (Eng.), F.D.S. R.C.S. (Edin.), Professor of Operative Dental Surgery, University of Sheffield. $8\frac{7}{8} \times 6$ in. Pp. 298 + viii, with 284 illustrations. 1961. London: William Heinemann Medical Books Ltd. 50s.

This is the first new text-book on operative dentistry written by an English author which has been published for many years. The book consists of nineteen chapters and an index, and is based on a series of lectures given at the School of Dental Surgery in the University of Sheffield. The chapters include: The Principles of Cavity Preparation, Instruments used in Operative Dentistry, Amalgam Restorations, Silicate Restorations, Gold Inlays, Gold Foil Restorations, Effects of Irritants on the Dentine and Methods of Desensitizing Dentine, Treatment of Diseases of the Pulp, Pulpectomy, Treatment of Pulpless Teeth, Post and Full Crowns, Jacket Crowns and Porcelain Inlays, Bridges, and a final chapter on Cavity Preparation with High-speed Instruments. The author has been careful to include the pathology and aetiology of dental diseases; the chemistry of dental materials and the pharmacology of drugs are described only to the extent of their bearing on the technique of operative dentistry and to emphasize the biological principles which lie behind the various techniques. The author points out that in recent years changes of practice have come about because of greater knowledge of the effect on the pulp of filling materials and of the techniques of preparing cavities and filling them.

New materials and new instruments are discussed, and a separate chapter, because of its importance, has been given to high-speed cutting instruments.

Crowns, bridges, and root-canal treatment are described in the second half of the book, which also includes the description of laboratory techniques of inlay, crown, and bridge work.

I think that the scope of this book is too wide and that crown and bridge work should have been left to a companion volume. The large number of line drawings are sharper and therefore much more helpful to the student than many of the photographs, which are not quite up to the standard of the American text-books, e.g., the retention grooves cannot be seen in Fig. 108, and Fig. 168 is only a poor reproduction of an X-ray film.

In spite of these minor criticisms of production, I am sure that students will find this book most helpful in their study of that branch of dental surgery to which they are going to devote so many hours of their working lives, and that many more experienced practitioners will find it a handy book of reference.

R. W. L.

DENTISTRY FOR THE PRE-SCHOOL CHILD. By G. N. Davies, D.D.S. (N.Z.), Associate Professor and Head of Department of Preventive, Public Health, and Children's Dentistry, University of Otago Dental School, Dunedin, N.Z.; and Richard M. King, B.D.S. (N.Z.), M.S. (Univ. of Mich.), Lecturer in Children's Dentistry, University of Otago Dental School, Dunedin, N.Z. $8\frac{1}{2} \times 5\frac{1}{2}$ in. Pp. 268+viii, with 51 illustrations. 1960. Edinburgh and London: E. & S. Livingstone Ltd. 32s. 6d.

For some time now there has been a need for a text-book of children's dentistry suitable for the undergraduate and the interested practitioner. In addition to this, the dental needs of the young child have long been neglected, mainly through ignorance on the part of the dental profession to manage in some practical way the treatment of this deserving group. This book would therefore seem to satisfy two needs.

It begins with an excellent appraisal of the methods of examination and diagnosis for this young age-group, and follows with a chapter on the management of children that is obviously written by somebody who not only has a profound knowledge of children and of the way they think, but who has considerable experience in dealing with them in the dental surgery.

From here on, apart from one or two notable exceptions, the book seems unbalanced, dogmatic, and, in parts, reads like a catalogue. Neither are the illustrations of the highest

quality. The chapter on diet and nutrition contains a list of essential nutrients with a superficial explanation of their metabolism. This is followed in the next chapter by a list of general diseases in children which may conceivably have oral manifestations, and then, in the chapter on orthodontics, by a list of abnormalities of occlusion and whether they should or should not be referred to an orthodontist. Space maintenance is dealt with at length by another catalogue of appliances, but the reader is left with only a hazy idea of when they should be used.

The authors would have been better advised either to have written a book dealing more profoundly with all those matters discussed superficially, or else to have limited the book strictly to everyday procedures carried out in the dental surgery on this young age-group. The latter would have been preferred, and the reader could then have been referred to the appropriate text-books that deal fully with the subjects of general importance. This would have left more space for a discussion of techniques and procedures of special application to dental disease in young children, which would have resulted in a less dogmatic approach to the subject.

This book will be of interest to general dental practitioners, public health dentists, and dental students.

P. J. H.

A MANUAL OF OPERATIVE DENTISTRY. By H. M. PICKARD, F.D.S. R.C.S. (Eng.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), Reader in Conservative Dentistry, University of London; Director of Department of Conservative Dentistry and Hon. Consultant Dental Surgeon, Royal Dental Hospital of London. $9\frac{1}{2} \times 6\frac{1}{2}$ in. Pp. 154 + viii, with 160 line drawings and 10 plates. 1961. London: Oxford University Press. 35s.

TEACHERS of operative dentistry have long felt the need for a concise, clearly written, and well illustrated book which could be recommended to students at the time of their first introduction to operative technique. Dr. Pickard's new book goes a long way towards filling this need and will certainly be warmly welcomed by both teachers and students.

By the free use of exceptionally good line drawings, the need for wordy descriptions has been reduced to a minimum and the preliminary chapters on examination and diagnosis, instruments and their uses, and the control of moisture and pain occupy only 33 pages. The main part of the book describes the aims and principles of cavity preparation and gives specific instructions for the preparation, lining, and filling of the simpler types of cavity using amalgam, silicate cement, acrylic resin, and gold inlays, while the final two chapters are devoted to the principles and practice of root-canal therapy. The techniques described are entirely orthodox and will be acceptable to the majority of teachers. High-speed instruments are briefly described, and their application to specific operations is included wherever it is indicated.

In order to keep the book to its present size many of the subjects which have been included in other text-books of operative dentistry have been omitted. Few will quarrel with the exclusion of all but the briefest reference to the physical properties of filling materials, or the omission of any account of crowns and bridges, for on these aspects many specialized texts are available. The decision to omit a description of gold foil restorations can be justified by the relative infrequency of their use in this country at the present time. On the other hand, many will regret the omission of all reference to indirect techniques for the construction of gold inlays. With the availability of thiokol and silicone elastic impression materials the proportion of inlays, particularly in posterior teeth, which are made by an indirect method, is increasing rapidly.

Despite this major omission, the book presents in a logical manner and in a particularly lucid fashion most of the information required by a student beginning his clinical studies. Though it will have little appeal for the established practitioner, it is a most welcome addition to the texts available to the undergraduate.

F. E. L.

RESORPTION OF INCISORS DUE TO MALDIRECTION OF ERUPTION OF UPPER CANINES

By **E. S. BROADWAY**, B.D.S., F.D.S., D.Orth. R.C.S.

RESORPTION of incisors due to malposition of the upper canines is fortunately rare. In the majority of cases where the position of the canines is such as to make their eruption into the arch uncertain, if these teeth are left undisturbed they rarely give rise to any trouble.

When resorption of the incisors does occur it usually starts at an early stage and seems to be more common in the 8–14-year age-group than later on. This makes the early diagnosis of the condition difficult. One may not suspect that the canines are misplaced at this stage of the eruption of the dentition, and usually the first sign of resorption of the incisors is when the patient complains of pain in these teeth.

The speed at which resorption takes place is difficult to assess, as the condition is usually treated as soon as it is diagnosed, but there is no doubt that in some cases it is extremely rapid. Mr. Hovell, in a personal communication, reports a case of an 8-year-old patient where the roots of the lateral incisors were completely resorbed. That the condition is not always progressive is illustrated by *Fig.* 1. The malposition of the upper canines was first noticed on radiographs at the age of 9 years. Unfortunately these X-rays are not available, so it is not possible to say if any resorption of the incisors had occurred at this stage. The present position at the age of 27 years is that all the incisors are resorbed to half their length and this has apparently been static for some years. The incisors are vital and of good colour and quite firm.

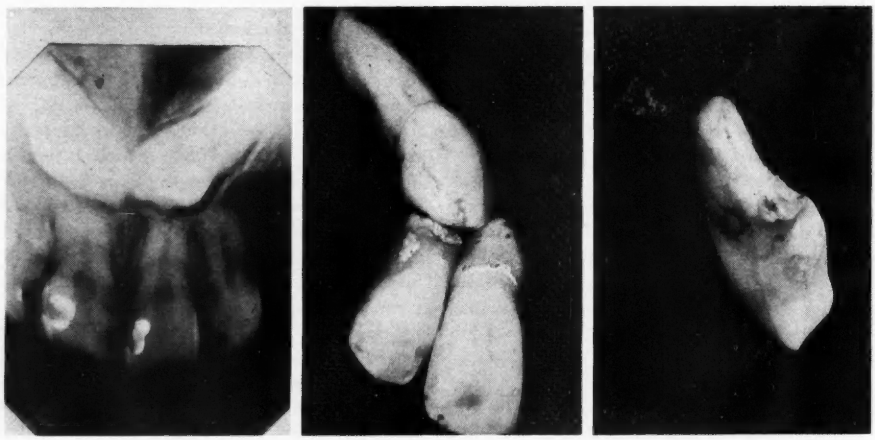

Fig. 1.—Case of resorption of the upper incisors by the upper canines.

It would seem that the main clinical feature of resorption of the incisors is pain, which only occurs at a somewhat late stage. Mobility of the affected teeth is not usually more marked, and one can be surprised by the extent of the resorption shown on radiographs when the

Given at the meeting held on February 13, 1961.

teeth are quite firm. Histology of the canine follicles does not show any significant difference between normal follicles and those from teeth which have caused resorption. Rarely the bucally-placed canine causes resorption of lateral incisors, and I am indebted to Mr. D. I. Smith for the details of one of his cases in which this occurred.

A CASE OF CONGENITAL FACIAL PALSY

By E. S. BROADWAY, B.D.S., F.D.S., D.Orth. R.C.S.

CONGENITAL facial palsy is a rare condition. Facial-nerve palsy in children is uncommon, though this was not so in the past due to the higher incidence of mastoiditis and to the accidental damage to the seventh nerve during mastoidectomy. The incidence of mastoiditis has been much diminished by the use of antibiotics in the treatment of otitis media. Seventh-nerve palsy, which is usually of a transient nature, occasionally follows a difficult forceps delivery when the forceps have not been correctly applied. This is the result of indirect pressure on the nerve, which is quite superficial in infancy.

Bell's palsy is the other common condition. This occurs usually in adults and its aetiology is not definitely known. It is alleged to follow sitting in a draught and has been thought to be due to a virus infection or herpes of the nerve, though the latest research work on this condition shows this to be rather doubtful. A spontaneous remission usually occurs in cases of Bell's palsy, but care has to be taken to prevent the stretching of the facial muscles. Physiotherapy and a support from a dental splint to the upper lip are usually employed. Sometimes decompression of the seventh nerve is carried out by opening up the stylomastoid canal.

Cerebral hæmorrhage or thrombosis are other causes of facial-nerve weakness.

The following case illustrates a true congenital facial-nerve palsy (*Fig.* 1).

CASE REPORT

There is no family history of any hereditary disease or congenital malformation. The patient is the second eldest son of a family of four boys and two girls. The mother had a normal pregnancy which was followed by a normal delivery and no forceps were used. The birth weight was 9½ lb. It was noticed soon after birth that the infant had a left-sided facial weakness. When seen he was found to be a fit boy with an obvious seventh-nerve palsy. Examination of the central nervous system showed no abnormalities apart from a complete seventh-nerve palsy together with an associated loss of the left corneal reflex. The seventh-nerve weakness was complete, and

Fig. 1.—Case of true congenital facial-nerve palsy.

there was flaccid paralysis of all the facial muscles, including the supra-trochlear group. Function was good, though there was some epiphora.

The patient was referred for an opinion on his occlusion, and there was found to be flattening of the arches on the left side and the upper lateral incisor was inside the bite. The flattening of the arch was due to the loss of function of the buccinator and orbicularis oris muscles on this side. Orthodontic treatment was confined to the alinement of the upper incisors. It is proposed to put in some fascia lata slings at a later date to hold up the corner of the mouth and support the lower eyelid.

DISCUSSION

[The two preceding papers were discussed jointly.]

The President said that the great tragedy, of course, was that early resorption of a tooth did not cause pain and, by the time it did, usually things had gone too far. Had Mr. Broadway ever followed up a case where a palatal canine had caused partial resorption of a lateral apex where the canine had been removed successfully without removing the lateral, and where the tooth had remained vital and symptomless over a long period of time? He personally was watching such a case and would be interested if other members had anything to contribute on this subject.

Mr. J. D. Hooper said that he was very interested in Mr. Broadway's paper. He was worried by the emphasis on the word "pain". He had seen about a dozen cases over the past years in which there had been resorption of teeth, but he had not yet heard a patient complain of pain. They had all been picked up on routine checks, so he did not want people to get the idea that one could spot the condition because of pain, because that was not the experience in the cases he had seen. In three cases the teeth were so badly resorbed that they had to be extracted. It was a question of at what degree of resorption pain might ensue.

Mr. D. F. Glass said he was particularly interested in the fact that Mr. Broadway considered that the lingual compression of the jaws on the palsied side of the face was due in some way to the palsy. Mr. Glass wondered whether this was the true cause. He had seen some cases in which the jaws were bowed outwards on the defective side, presumably due to the paralysis of the muscles on that side with the accompanying lack of muscle pressure. With regard to unerupted canines which frequently resorbed the roots of lateral and central incisors, did he consider that if the canines met in the midline they would resorb each other?

Mr. W. Russell Logan thanked Mr. Broadway for the very interesting cases that he had shown. He was interested in the case of the palsy with the lack of tone in the left side of the face. He had seen one or two of those cases and had always been surprised at how little disturbance there was in the shape of the arches. It was becoming known that if there was pressure exerted by the soft tissues on the teeth there was more from the tongue side than from the buccal side; one would expect a bowing of the arch to that side, but, in the cases of congenital palsy, it was indeed surprising how regular the arch was, and how there was very little disturbance at all in spite of lack of pressure from the buccal tissues and labial tissues on one side of the mouth.

Mr. A. G. Huddart said, with regard to the palatally impacted canines, in severe cases where they could not be alined satisfactorily, by orthodontic means, he had been advocating their removal. The oral surgeons, however, were sometimes reluctant to do this. He wondered whether Mr. Broadway had any idea what proportion of badly palatally displaced canines, such as those he had shown meeting in the midline, was likely to cause resorption of the adjacent permanent incisor roots?

Mr. M. A. Kettle agreed with Mr. Hooper that pain symptoms were very rare in these cases, and usually, on removal of the impacted canine, symptoms, such as they were, disappeared.

He did not feel that the resorption should be considered a continuous process; if the offending canine was removed it might continue for a short time, but come to an end, allowing the tooth to be retained in the mouth. That brought him to the case in which they had seen three teeth, two incisors and a canine, after extraction—a very beautiful picture, but he felt that the clinical picture would have been prettier if the canine alone had been removed.

Mr. Broadway, replying, said that he would like to reply firstly on the case of congenital facial palsy. Like Mr. Glass, he assumed that if there was a facial palsy, there should be a bowing out of the arch on the affected side, and, there being lack of muscle tone, the tongue should push the teeth out, so he had taken a very great deal of care to make sure that he got the sides right, and that in fact there was a flattening on the affected side, and not a bowing on the affected side. He thought Mr. Tulley's explanation was the correct one, that the flaccidity of the muscles acted rather like an orthodontic appliance. The muscle just lay on the teeth and put the arch slightly out of muscle balance and pushed the teeth in. If one thought about it, one could persuade oneself—at least, he had persuaded himself—that that was so, when one dealt with facial palsies. The edentulous patient with Bell's palsy found it difficult to keep down the lower and keep up the upper. The side that fell down was not the side where the muscles were active but the side where the muscles were paralysed; it dropped down, was pushed up, and dropped down again. Possibly that was an explanation of the problem. It would perhaps be nice to collect a series of those cases, and Mr. Glass probably had a better opportunity than anyone of collecting this series, working as he did in a big plastic unit.

As regards canines, on the first question, of pain, he hoped he had emphasized that this was a late symptom. When pain was felt, it was too late to do anything except take the painful tooth out. He agreed with Mr. Hooper that, if one had routine checks, one might find those cases before pain started and then do something about it. He was not sure what one could do about it, though, because when the canine was causing resorption of the incisors, one needed skilful oral surgery to remove the canine without damaging the roots of the lateral or central incisors.

On Mr. Smith's question as to whether the crowns of the teeth had to be in contact, he did not know. All he could say was that in the two cases where the teeth were, in fact, removed, at Ipswich, the surgeon (Ireland) assured him that the teeth were in contact, but he himself saw no reason why they should be. He imagined pressure from the crypt could cause resorption of the root, though he did not know. That was the real answer—he did not know.

In reply to Mr. Kettle, he said that even if the canines were not removed, the resorption might stop. The last case illustrated that the tooth did not appear to be resorbing in the adult although considerable resorption had taken place at some time, presumably during the normal time of eruption of the canine. All the teeth which had been removed in that series had been removed by the oral surgeon because of acute pain. None of them had been removed just because they were loose or because they seemed to be resorbed. The lateral incisor was removed for orthodontic reasons because it was felt that there was a better chance of getting a sound canine into place than leaving a resorbed lateral in place.

He hoped that he had covered the main points in the questions.